

Urban biodiversity research at Bailu Park,Suzhou with indicator species (Lepidoptera)

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Abstract

We sampled indicator species by carrying on biobitz to evaluate the ecological health at Bailu Park, Suzhou and identifying species by PCR, Sanger sequencing and Nanopore sequencing. The outcome indicates Bailu Park suffers from a lack of even and diverse distribution of species. Only 7 genera in Lepidoptera with close evolutionary relationships were observed and they were distributed in a narrow and restricted range,which was caused by uneven distributed nectar plants and host plants and lack in their diversity. Whether Walbachia endosymbiont infection was a factor remained to be discussed.

Key words: indicator species ; bioblitz ; Bailu Park ,Suzhou ; PCR ; Sanger sequencing ; Nanopore sequencing ; Lepidoptera ; Walbachia endosymbiont

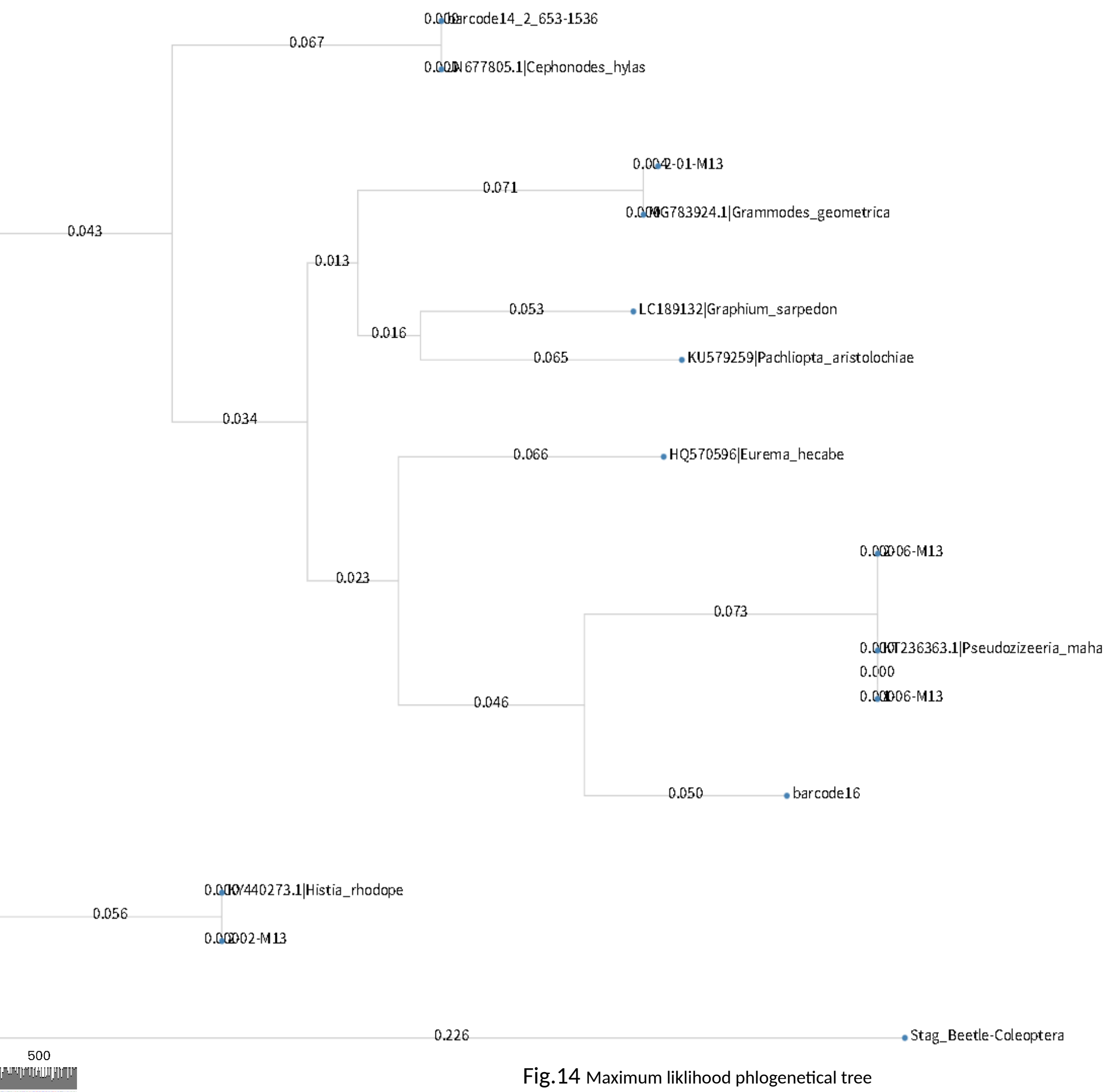
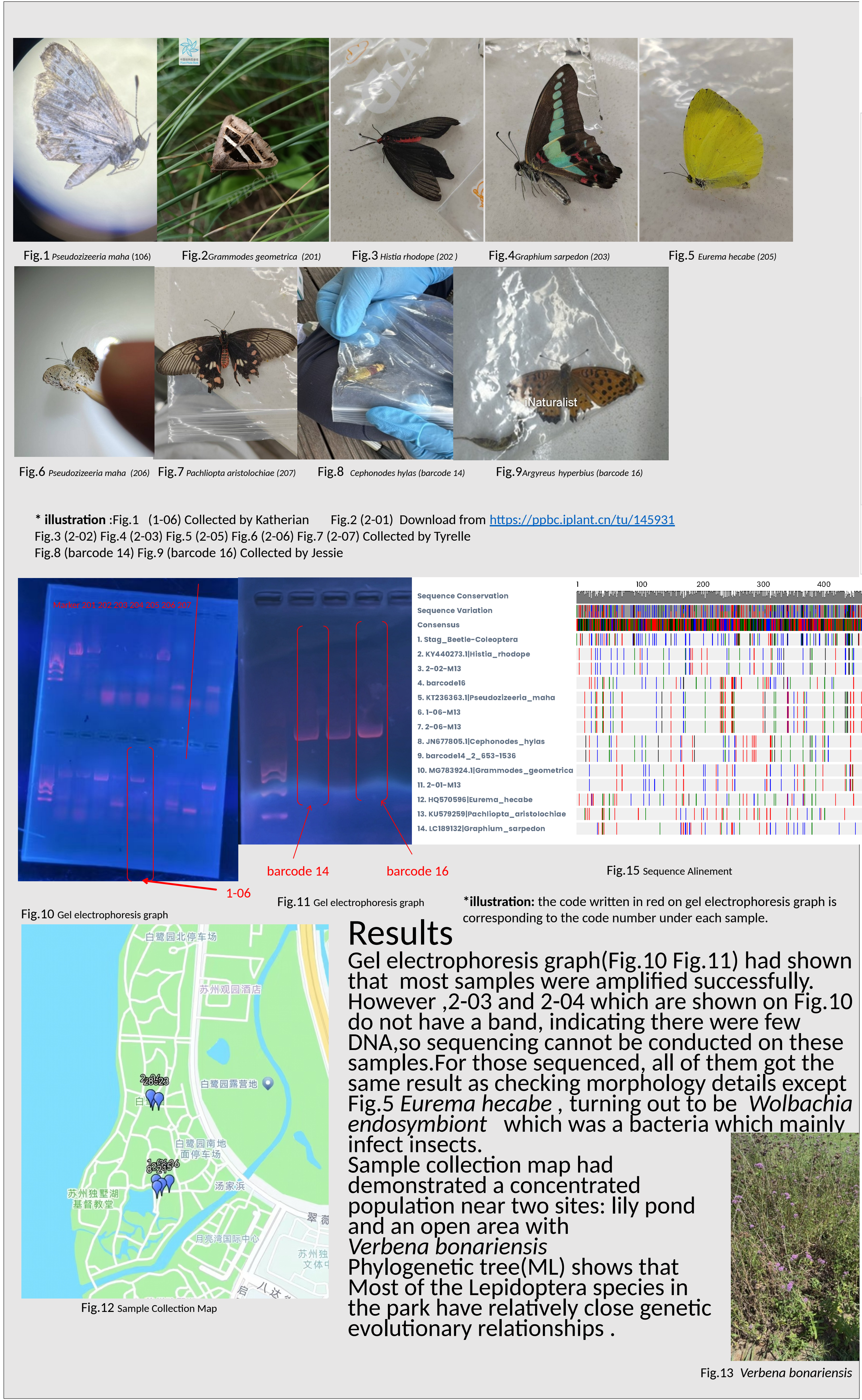
Introduction

In recent years , many cities have been promoting the construction of urban green space systems to relief urban environmental issues , including heat island effect and low air quality. However ecological health is needed for the system to work sustainably and effectively. Therefore sampling some indicator species such as butterflies can, to some extent, reflect the ecosystem condition.[1-2]. Evidence shows that the Lepidoptera is one of the most diverse orders of insects, playing an essential role in ecosystem functions[3-4].Finding the distribution pattern of this order can provide evidence for researches into other relevant species, such as the nectar plants and host plants .

Materials & Methods

By conducting bioblitz in the park, I obtained the overall distribution of Lepidoptera species. To identify the species which the samples exactly belong to , I chose to sequence their DNA by Sanger sequencing method, Nanopore method and check their morphology details on Monographian Rhopalocerorum Sinensium.[5] Preparing for the sequencing ,rough extraction with Chelex ® solution and PCR with target gene COI and analyze the products of PCR by gel eletrophoresis ¹ is needed.

For analyzing the evolutionary relationship between these species ,I uploaded the DNA sequences to the website DNA Subway 2.0 [6] to trim the sequences and search for BLAST result and constructing maximum likelihood phlogenetic trees².



Discussion

Unreasonable distribution of plant is causing a major problem for Bailu Park diversity. Many non-native plants have introduced and may have occupied the ecological niche of native host plants, diminishing the diversity of the species which mainly lived on certain native plants. Therefore, highly adaptive species can have a more competitive advantage .

Reintroducing native species and designing a more even distribution of plants may be helpful to this situation.

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^{*1} Gel electrophoresis is a laboratory technique used to separate mixtures of DNA based on their size .
^{*2}Maximum liklihood phlogenetical tree is a statistical method for inferring the evolutionary relationships among a set of species based on their sequences. It finds the tree that makes the observed sequence data most probable under a specific model of evolution.